UCRL-JC-126311 Abs

Abstract in preparation for submittal to the
13th International Conference on
Laser Interactions and Related Plasma Phenomena
13-18 April, 1997, Monterey, CA

Simulations of supernova-relevant hydrodynamics experiments on the Nova laser,* J. Kane,[1] W.D. Arnett,[1] B.A. Remington,[2] S.G. Glendinning,[2] and A. Rubenchik,[3] [1]U. Arizona, [2]LLNL, [3]U.C. Davis. Supernova 1987A focused attention on the critical role of hydrodynamic instabilities in the evolution of supernovae. To test the modeling of these instabilities, we are developing laboratory experiments of hydrodynamic mixing under supernova-relevant conditions. The target consists of a two-layer planar package composed of 85 micron of copper backed by 500 micron of plastic, with a single mode 200 micron wavelength, 20 micron amplitude sinusoidal perturbation at the interface. The Nova laser is used in indirect-drive to generate a 10-15 Mbar shock which triggers perturbation growth due to the Rayleigh-Taylor instability as the shocked interface decelerates. This simulates the situation at the He-H interface of a Type II supernova the first few hours after the explosion. Modeling of the experiment is done using the hydrodynamics codes HYADES and CALE, and the supernova code PROMETHEUS. Results of the experiments and simulations will be presented, and possible implications for supernova modeling will be discussed. *Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.